CHARGING SYSTEM

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a charging system, and more particularly to a charging system for portable equipment.

Description of the Related Art

A state where a portable telephone is being charged by a prior-art contactless charging system based on electromagnetic induction, is shown in Fig. 3. The portable telephone 1 includes a secondary side coil 2, while a charger 3 includes a primary side coil 7. A user sets the portable telephone 1 on the charger 3 as shown in the figure and charges it for a predetermined time period when the remaining battery capacity of the portable telephone 1 has become small, or when the portable telephone 1 is not used for a long time.

With the prior-art charging system as shown in Fig. 3, however, there is a spacing 5 between the primary side coil 7 and the secondary side coil 2, and induction cores 6 are kept apart, so that problems as mentioned below have been involved:

1. Since both the portable equipment and the charger need to include the cores made of a magnetic material such as metal, the weight and size of the portable equipment are increased.
2. Since the primary side coil and the secondary side coil are separate, even a very small deviation in the relative position

between the coils exerts influence on a charging efficiency.

3. When a coin or an accessory article is accidentally held in the charger, a metal generates heat due to an induction current and forms the cause of a fire.

4. Since the charger is designed in adaptation to the geometries of the portable equipment, no charger can cope with a plurality of sorts of portable equipment.

SUMMARY OF THE INVENTION

The present invention has for its object to provide a charging system which solves the problems mentioned above, and which can cope with various sorts of portable equipment and can attain a stable charging efficiency.

According to the present invention, in order to accomplish the object, a charging system of Claim 1 is characterized by comprising a charging device which includes an induction core penetrating through a primary side coil, and a portable equipment which includes an insertion portion containing a secondary side coil and allowing said induction core to pass therethrough.

Besides, a charging device of Claim 2 is a charging device for a charging system having the charging device which includes an induction core penetrating through a primary side coil, and a portable equipment which includes an insertion portion containing a secondary side coil and allowing the induction core to pass therethrough, and it is characterized by comprising said

primary side coil, and a power feed portion.

In addition, a portable equipment of Claim 3 is characterized by comprising an insertion portion through which an induction core of a charging device as penetrates through a primary side coil thereof is allowed to pass, and in which a secondary side coil for performing charging is contained.

Still in addition, a charging system of Claim 4 is characterized by comprising a charging device which includes a hook-shaped induction core penetrating through a primary side coil, and a portable equipment which includes a charging arch containing a secondary side coil and allowed to be suspensibly attached to said induction core.

Yet in addition, a charging device of Claim 5 is a charging device for a charging system having the charging device which includes a hook-shaped induction core penetrating through a primary side coil, and a portable equipment which includes a charging arch containing a secondary side coil and allowed to be suspensibly attached to the induction core, and it is characterized by comprising a power feed portion, said primary side coil, and said hook-shaped induction core.

Further, a portable equipment of Claim 6 is characterized by comprising a charging arch which is allowed to be suspensibly attached to a hook-shaped induction core of a charging device as penetrates through a primary side coil thereof and which is provided at an end part of a body of the portable equipment,

and a secondary side coil which serves to perform charging and which is contained in an annular space defined by said charging arch and a part under said arch.

Still further, a charging method of Claim 7 is a charging method for a portable equipment employing the charging system of Claim 1, characterized by comprising the step of installing said charging device; the step of passing said induction core through said insertion portion; and the step of holding said insertion portion and said induction core set for a predetermined time period.

Yet further, a charging method of Claim 8 is a charging method for a portable equipment employing the charging system of Claim 4, characterized by comprising the step of fixing said charging device onto a plane perpendicular to the ground; the step of passing said induction core through said charging arch; and the step of holding said portable equipment suspensibly attached to said induction core for a predetermined time period.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a view showing the state of the use of a charging system according to the present invention;

Fig. 2 is an enlarged view of the interior of the charging system according to the present invention; and

Fig. 3 is a view showing the state of the charging of a portable telephone in the prior art.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Now, an embodiment of the present invention will be described in detail with reference to Figs. 1 and 2.

Fig. 1 is a view showing a state where a charging system in the embodiment of the present invention is used, while Fig. 2 is an enlarged view of the interior of the charging system in the embodiment of the present invention.

As shown in Fig. 1, a wall 103 is erected perpendicularly to a floor 101 (the ground), and a charger body 105 in which a primary side coil 201 and a power feed portion 203 (shown in Fig. 2) are included is attached to the wall 103. An induction core 107 stretches in the shape of a hook from the charger body 105, and penetrates through the primary side coil 201 inside the charger body 105. The induction core 107 stretching from the charger body 105 can suspend a portable telephone 109 and another portable equipment 111 through charging arches 113. Here, the charger body 105 includes a fixation member for fixing this body to the wall 103. The portable telephone 109 and the other portable equipment 111 are suspended from the induction core 107 as shown in Fig. 1 for a predetermined time period, whereby batteries built in the equipment 109 and 111 can be charged.

The interior of the portable telephone 109 in Fig. 1, as well as a charging device (211), is shown as an enlarged view in Fig. 2. A secondary side coil 205 is disposed on the side

of the portable telephone 109, and it is connected with a rechargeable battery (the built-in battery) 207. The induction core 107 penetrates through the secondary side coil 205 as shown in Fig. 2. From this fact, it is understood that the secondary side coil 205 exists in an annular space which is defined by the charging arch 113 shown in Fig. 1 and a part under this arch 113.

On the other hand, a dotted line 211 indicates part of the charging device which is included inside the charger body 105 in Fig. 1. The primary side coil 201 is connected with the power feed portion 203, and the induction core 107 is mounted so as to penetrate through the primary side coil 201. When an AC voltage is applied from the power feed portion 203 in this state, a magnetic flux is generated in the induction core 107, and a voltage is induced across the secondary side coil 205 by the action of electromagnetic induction, so that the charging of the battery 207 is initiated.

While the embodiment of the present invention has been described above, advantages listed below are brought forth by the present invention:

1. The portable equipment can be made smaller in size and lighter in weight.

2. Since the induction core extends from the primary side coil over to the secondary side coil, a stable charging efficiency can be attained by hanging the portable equipment on the

charging hook.

3. It is not apprehended by way of example that a small metal piece will accidentally enter the cradle portion of a charger, thereby to cause a fire.

4. The single charger can cope with the plurality of sorts of portable equipment, and can also charge a plurality of portable equipment simultaneously.

5. The charger is suited to the attachment on a wall surface, and the required space of the charging system can be saved.

6. A charging connection portion need not be provided unlike in conventional charging which employs electric contacts. Therefore, it is facilitated to endow the portable equipment with a water-proof structure, and troubles such as the corrosion of the charging connection portion can be avoided.

Incidentally, the foregoing embodiment of the present invention has been described on the case of performing the charging in the state in which the charging arch provided on the side of the portable equipment is suspensibly attached to the hook-shaped induction core stretching from the charger body. However, charging may well be performed in such a way that a charger body is installed (or buried) with an induction core stretching perpendicularly from the ground (such as a floor), and that an insertion portion containing a secondary side coil is set so as to pass the induction core therethrough, whereupon both the members (the induction core and the insertion portion)

are held set for a predetermined time period.

Besides, the foregoing embodiment of the present invention has been described on the case of mounting the charger body outside the wall, but it is obvious that the charger body may well be mounted inside the wall.

In addition, the foregoing embodiment of the present invention has been described as including the primary side coil, the power feed portion and the induction core as the constituent elements of the charging device, but it is obvious that any other constituent element may well be included in the charging device.

Yet in addition, the foregoing embodiment of the present invention has been described on the case of mounting the charging device on the wall in a building, the charging device may be mounted, not only in the building, but also in an automobile by way of example.

In this manner, according to the present invention, a charging system capable of coping with various sorts of portable equipment and attaining a stable charging efficiency can be provided.